

WHAT IS CLAIMED IS:

1. A lens device comprising:

variator lens means for performing a zooming

5 operation;

zoom operating means for operating said variator

lens means;

information output means for outputting operation

information sent from said zoom operating means and for

10 outputting zooming position information of said variator

lens means;

information input means for receiving control

information, which is used for controlling said variator

lens means, from an external device; and

15 variator control means for controlling a zooming

operation of said variator lens means according to the

inputted control information.

2. The lens device according to claim 1, wherein the

20 control information contains information on at least one

of a direction and a speed given to said variator lens

means.

3. The lens device according to claim 1, wherein said

25 information output means outputs the operation

information when said variator lens means is placed at a

tele end.

4. An imaging apparatus comprising:

imaging means for imaging an object and for

5 outputting an image signal;

information input means for receiving external zoom  
operating information and zoom position information to  
be supplied to external variator lens means;

zoom operating means for receiving internal zoom  
10 operating information to be supplied to said external  
variator lens means; and

information output means for generating and  
outputting optical zooming control information to be  
used for controlling a zooming operation of said  
15 external variator lens means according to the inputted  
external zoom operating information and the inputted  
zoom position information and the internal zoom  
operating information received from said zoom operating  
means.

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5. The imaging apparatus according to claim 4, which  
further comprises:

electronic zooming means for performing electronic  
enlargement processing on an image represented by the  
25 image signal; and

electronic zooming control means for controlling

said electronic zooming means according to the inputted external zoom operating information, the inputted zoom position information and the internal zoom operating information.

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6. The imaging apparatus according to claim 4, wherein the external zoom operating information and the internal zoom operating information contain information on at least one of a direction and a speed given to said external variator lens means.

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7. The imaging apparatus according to claim 5, wherein said electronic zooming means performs the enlargement processing when the zoom position information indicates a tele end.

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8. The imaging apparatus according to claim 4, wherein said information output means gives the external zoom operating information precedence over the internal zoom operating information when the external zoom operating information indicates that a zooming operation is being performed.

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9. The imaging apparatus according to claim 5, wherein said electronic zooming control means gives the external zoom operating information precedence over the internal

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zoom operating information when the external zoom operating information indicates that a zooming operation is being performed.

5 10. An imaging system comprising:

a lens device having:

a variator lens means for performing a zooming operation;

10 lens-side zoom operating means for operating said variator lens means;

lens-side information output means for outputting lens-side zoom operating information and zoom position information on a zoom position of said variator lens means, which are received from said lens-side zoom

15 operating means;

lens-side information input means for receiving optical zoom control information to be used for controlling said variator lens means; and

20 variator control means for controlling a zooming operation of said variator lens means according to the received control information, and an imaging apparatus having:

imaging means for imaging an object and for outputting an image signal;

25 camera-body-side information input means for receiving the lens-side zoom operating information and

zoom position information from said lens-side  
information output means;

camera-body-side zoom operating means for receiving  
camera-body-side zoom operating information to be  
5 supplied to said variator lens means; and

camera-body-side information output means for  
generating optical zooming control information to be  
used to control a zooming operation of said variator  
lens means, according to the received lens-side zoom  
10 operating information and the received zoom position  
information and the camera-body-side zoom operating  
information and for outputting the optical zooming  
control information to said lens-side information input  
means.

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11. The imaging system according to claim 10, wherein  
said imaging apparatus further comprises:

electronic zooming means for performing electronic  
enlargement processing on an image represented by the  
20 image signal; and

electronic zooming control means for controlling  
said electronic zooming means according to the lens-side  
zoom operating information, the zoom position  
information and the camera-body-side zoom operating  
25 information.

12. The imaging system according to claim 10, wherein the optical zooming control information contains information on at least one of a direction and a speed given to said variator lens means.

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13. The imaging system according to claim 10, wherein said lens-side information output means outputs the lens-side zoom operating information when said variator lens means is placed at a tele end.

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14. The imaging system according to claim 11, wherein said electronic zooming control means performs the enlargement processing when the zoom position information indicates a tele end.

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15. The imaging system according to claim 10, wherein said camera-body-side information output means gives the lens-side zoom operating information precedence over the camera-body-side zoom operating information when the

20 lens-side zoom operating information indicates that a zooming operation is being performed.

16. The imaging system according to claim 11, wherein said electronic zooming control means gives the lens-  
25 side zoom operating information precedence over the camera-body-side zoom operating information when the

lens-side zoom operating information indicates that a zooming operation is being performed.

17. The imaging system according to claim 10, wherein a  
5 cycle of transmission and reception of information  
between said lens-side information output means and said  
camera-body-side information input means and between  
said lens-side information input means and said camera-  
body-side information output means is nearly equal to a  
10 cycle of a standard television vertical synchronization  
signal.

18. A computer readable storage medium for storing a  
program causing a computer to execute the steps of:  
15 outputting operation information, which is obtained  
when a variator lens is operated, and zoom position  
information which represents a zoom position of said  
variator lens;  
inputting control information, which is used for  
20 controlling said variator lens, from an external device;  
and  
controlling said variator lens according to the  
inputted control information.

25 19. A computer readable storage medium for storing a  
program causing a computer to execute the steps of:

imaging an object and outputting an image signal;  
receiving external zoom operating information and  
zoom position information to be supplied to an external  
variator lens;

5 receiving internal zoom operating information to be  
supplied to said external variator lens; and

generating and outputting optical zooming control  
information to be used for controlling a zooming  
operation of said external variator lens according to  
10 the inputted external zoom operating information and the  
inputted zoom position information and the internal zoom  
operating information.

20. A lens device comprising:

15 variator lens means for performing a zooming  
operation;

zoom operating means for operating said variator  
lens means;

information output means for outputting first zoom  
20 operating information, which is received from said zoom  
operating means, and zoom position information  
representing a zoom position of said variator lens  
means;

information input means for receiving second zoom  
25 operating information and zooming inhibition information  
from an external device; and

variator control means for controlling a zooming  
operation of said variator lens means according to the  
first zoom operating information, the inputted second  
zoom operating information and the inputted zooming  
5 inhibition information.

21. The lens device according to claim 20, wherein the  
first zoom operating information and the second zoom  
operating information contain information on at least  
10 one of a direction and a speed given to said variator  
lens means.

22. The lens device according to claim 20, wherein said  
information output means outputs the first zoom  
15 operating information when said variator lens means is  
placed at a tele end.

23. The lens device according to claim 20, wherein said  
variator control means gives the first zoom operating  
20 information precedence over the second zoom operating  
information when the first zoom operating information  
indicates that a zooming operation is being performed.

24. A camera apparatus comprising:  
25 imaging means for imaging an object and for  
outputting an image signal;

information input means for receiving first zoom  
operating information and zoom position information to  
be supplied to external variator lens means;

zoom operating means for receiving second zoom  
5 operating information to be supplied to said external  
variator lens means;

information output means for outputting the second  
zooming control information and optical zooming  
inhibition information to be used for inhibiting a  
10 zooming operation of said external variator lens means;

electronic zooming means for performing electronic  
enlargement processing on an image represented by the  
image signal; and

electronic zooming control means for controlling  
15 said electronic zooming means according to the first  
zoom operating information, the zoom position  
information and the second zoom operating information.

25. The camera apparatus according to claim 24, wherein  
20 the first zoom operating information and the second zoom  
operating information contain information on at least  
one of a direction and a speed given to said external  
variator lens means.

25 26. The camera apparatus according to claim 24, wherein  
said electronic zooming means performs the enlargement

processing and said information output means outputs the optical zooming inhibition information when the first zoom operating information and the second zoom operating information indicate a tele end.

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27. The camera apparatus according to claim 24, wherein said electronic zooming control means and said information output means give the first zoom operating information precedence over the second zoom operating information when the first zoom operating information indicates that a zooming operation is being performed.

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28. A camera system comprising:

a lens device having:

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a variator lens means for performing a zoomingoperation;

lens-side zoom operating means for operating said variator lens means;

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lens-side information output means for outputting first zoom operating information, which is received from said lens-side zoom operating means, and zoom position information on a zoom position of said variator lens means;

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lens-side information input means for receiving second zoom operating information and zooming inhibition information from an external device; and

variator control means for controlling a zooming operation of said variator lens means according to the received second zoom operating information and the zooming inhibition information and the first zoom  
5 operating information, and  
an imaging apparatus having:  
imaging means for imaging an object and for outputting an image signal;  
camera-body-side information input means for  
10 receiving the first zoom operating information and zoom position information from said lens-side information output means;  
camera-body-side zoom operating means for receiving the second zoom operating information to be supplied to  
15 said variator lens means; and  
camera-body-side information output means for outputting said lens-side information input means the second zoom operating information and the optical zooming inhibition which is used for inhibiting said  
20 variator lens means from performing a zooming operation;  
electronic zooming means for performing electronic enlargement processing on an image represented by the image signal; and  
electronic zooming control means for controlling  
25 said electronic zooming means according to the first zoom operating information, the zoom position

information and the second zoom operating information.

29. The camera system according to claim 28, wherein  
the first zoom operating information and the second zoom  
5 operating information contain information on at least  
one of a direction and a speed given to said external  
variator lens means.

30. The camera system according to claim 28, wherein  
10 said lens-side information output means outputs the  
first zoom operating information said electronic zooming  
control means performs the enlargement processing when  
said variator lens means is placed at a tele end.

15 31. The camera system according to claim 28, wherein  
said camera-body-side information output means and said  
electronic zooming means give the first zoom operating  
information precedence over the second zoom operating  
information when the first zoom operating information  
20 indicates that a zooming operation is being performed.

32. The camera system according to claim 28, wherein a  
cycle of transmission and reception of information  
between said lens-side information output means and said  
25 camera-body-side information input means and between  
said lens-side information input means and said camera-

body-side information output means is nearly equal to a cycle of a standard television vertical synchronization signal.

5    33. A computer readable storage medium for storing a program causing a computer to execute the steps of:

          outputting first zoom operating information, which is obtained when a variator lens is operated, and zoom position information which represents a zoom position of  
10    said variator lens;

          inputting second zoom operating information and zooming inhibition information, which are received from an external device; and

          controlling said variator lens according to the  
15    inputted second zoom operating information, the inputted zooming inhibition information and the first zoom operating information.

          34. A computer readable storage medium for storing a  
20    program causing a computer to execute the steps of:

          imaging an object and outputting an image signal;

          receiving first zoom operating information and zoom position information to be supplied to an external variator lens;

25        receiving second zoom operating information to be supplied to said external variator lens;

outputting the second zooming control information and optical zooming inhibition information to be used for inhibiting said external variator lens from performing a zooming operation; and

5 performing electronic zooming for electronically enlarging an image represented by the image signal according to the first zoom operating information and the second zoom operating information and the zoom position information.

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35. A lens control system comprising:

a first device having optical variator means for optically changing a magnification of an image;

a second device having electronic variator means  
15 for electronically enlarging an image by signal processing; and

first and second variator operating members respectively provided in said first and second devices,

wherein, when said optical variator means is  
20 operated, said optical variator means is controlled in said first device according to information for operating said first and second variator operating members,  
wherein, when said electronic variator means is operated, said electronic variator means is controlled in said  
25 second device according to information for operating said first and second variator operating members, and

wherein, during said electronic variator means is operated, said first device inhibits said optical variator means from operating..

5 36. A camera system comprising:

a lens device having an optical variator lens for optically changing a magnification of an image;

a camera device having electronic variator means for electronically enlarging an image by signal

10 processing;

a lens-device-side variator operating member; and

a camera-device-side variator operating member,

wherein, when said optical variator lens is operated, said optical variator lens is controlled in  
15 said lens device according to information for operating said lens-device-side and camera-device-side variator operating members,

wherein, when said electronic variator means is operated, said electronic variator means is controlled  
20 in said camera device according to information for operating said lens-device-side and camera-device-side variator operating members, and

wherein, during said electronic variator means is operated, a signal causing said lens device to inhibit  
25 said optical variator lens from operating is transmitted to said lens device.

37. A camera device for use in a camera system having a lens device having an optical variator lens for optically changing a magnification of an image, a lens-  
5 device-side variator operating member and a camera-device-side variator operating member, said camera device comprising:

electronic variator means for electronically enlarging an image by signal processing,

10 wherein, when said optical variator lens is operated, said optical variator lens is controlled in said lens device according to information for operating said lens-device-side and camera-device-side variator operating members,

15 wherein, when said electronic variator means is operated, said electronic variator means is controlled in said camera device according to information for operating said lens-device-side and camera-device-side variator operating members, and

20 wherein, during said electronic variator means is operated, a signal causing said lens device to inhibit said optical variator lens from operating is transmitted to said lens device.

25 38. A camera device for use in a camera system having a camera device having electronic variator means for

electronically enlarging an image by signal processing,  
a lens-device-side variator operating member, and a  
camera-device-side variator operating member, said a  
lens device comprising:

5        an optical variator lens for optically changing a  
magnification of an image,

         wherein, when said optical variator lens is  
operated, said optical variator lens is controlled in  
said lens device according to information for operating  
10      said lens-device-side and camera-device-side variator  
operating members,

         wherein, when said electronic variator means is  
operated, said electronic variator means is controlled  
in said camera device according to information for  
15      operating said lens-device-side and camera-device-side  
variator operating members, and

         wherein, during said electronic variator means is  
operated, a signal causing said lens device to inhibit  
said optical variator lens from operating is transmitted  
20      to said lens device.

39.    A lens device comprising:

         variator lens means for performing a zooming  
operation;

25      control means for controlling the zooming operation  
of said variator lens means; and

signal output means for outputting an electronic  
zooming enabling signal and an electronic zooming  
preparation signal for giving advance notice of the  
electric zooming enabling signal, during the zooming  
5 operation.

40. The lens device according to claim 39, wherein said  
signal output means outputs the electronic zooming  
enabling signal when said variator lens means is placed  
10 at a tele end.

41. The lens device according to claim 39, wherein said  
signal output means outputs the electronic zooming  
preparation signal when said variator lens means reaches  
15 the tele end within a predetermined time if said  
variator lens means continues performing a current  
zooming operation.

42. The lens device according to claim 39, wherein said  
20 signal output means outputs the electronic zooming  
preparation signal when said variator lens means reaches  
the tele end within a predetermined time, which is a  
predetermined integral multiple of a cycle of a standard  
television signal, if said variator lens means continues  
25 performing a current zooming operation.

43. An imaging apparatus comprising:

imaging means for imaging an object and for  
outputting an image signal;

electronic zooming means for electronically  
5 enlarging an image represented by the image signal;

signal input means for receiving an electronic  
zooming preparation permission signal and an electronic  
zooming enabling signal; and

control means for enabling control of said  
10 electronic zooming means when each of the electronic  
zooming preparation permission signal and the electronic  
zooming enabling signal is received.

44. The imaging apparatus according to claim 43,  
15 wherein said signal input means receives position  
information of a zoom lens.

45. The imaging apparatus according to claim 43,  
wherein said control means starts controlling said  
20 electronic zooming means when the electronic zooming  
preparation permission signal is received.

46. An imaging system comprising:  
a lens device having:  
25 a variator lens means for performing a zooming  
operation;

first control means for controlling the zooming  
operation of said variator lens means; and

signal output means for outputting an electronic  
zooming enabling signal and an electronic zooming  
5 preparation permission signal which gives advance notice  
of the electric zooming enabling signal, during the  
zooming operation, and  
an imaging apparatus having:

imaging means for imaging an object and for  
10 outputting an image signal;

electronic zooming means for performing electronic  
enlargement processing on an image represented by the  
image signal;

signal input means for receiving an electronic  
15 zooming preparation permission signal and an electronic  
zooming enabling signal; and

second control means for enabling control of said  
electronic zooming means when each of the electronic  
zooming preparation permission signal and the electronic  
20 zooming enabling signal is received.

47. The imaging system according to claim 46, wherein  
said signal output means outputs the electronic zooming  
enabling signal when said variator lens means is placed  
25 at a tele end.

48. The imaging system according to claim 46, wherein,  
during said variator lens means performs the zooming  
operation, said signal output means outputs the  
electronic zooming preparation signal if said variator  
5 lens means reaches the tele end within a predetermined  
time when said variator lens means continues performing  
the zooming operation.

49. The imaging system according to claim 46, wherein  
10 said signal output means outputs the electronic zooming  
preparation signal when said variator lens means reaches  
the tele end within a predetermined time, which is a  
predetermined integral multiple of a cycle of a standard  
television signal, if said variator lens means continues  
15 performing a current zooming operation.

50. The imaging system according to claim 46, wherein  
said second control means starts controlling said  
electronic zooming means when the electronic zooming  
20 preparation permission signal is received.

51. The imaging system according to claim 46, wherein  
said signal output means and said signal input means  
transmit and receive the electronic zooming preparation  
25 permission signal and the electronic zooming enabling  
signal in synchronization with a standard television

vertical synchronization signal.

52. A computer readable storage medium for storing a program causing a computer to execute the steps of:

5       controlling a zooming operation performed by a variator lens; and

          outputting an electronic zooming enabling signal and an electronic zooming preparation permission signal which gives advance notice of the electric zooming enabling signal, during the zooming operation.

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53. A computer readable storage medium for storing a program causing a computer to execute the steps of:

          imaging an object and outputting an image signal;

15       performing electronic zooming for electronically enlarging an image represented by the image signal;

          receiving an electronic zooming preparation permission signal and an electronic zooming enabling signal; and

20       enabling the electronic zooming when each of the electronic zooming preparation permission signal and the electronic zooming enabling signal is received.

54. An imaging apparatus comprising:

25       imaging means;

          electronic zooming means for enlarging an image

taken by said imaging means;

zoom input means for receiving zoom operating information;

lens information input means for receiving first  
5 zoom information, which indicates presence or absence of  
an optical zooming mechanism in an external lens means,  
and second zoom information which indicates presence or  
absence of an optical zooming mechanism, which does not  
operate in response to a control signal received from an  
10 external device, in said external lens means;

control output means for outputting an optical  
zooming control signal which instructs said external  
lens means to perform a zooming operation; and

control means for controlling said optical zooming  
15 mechanism of said external lens means through said  
electronic zooming means and said lens control output  
means according to the zoom operating information  
inputted to said zoom input means in such a manner as to  
be able to be driven, in a case that the first zoom  
20 information indicates the presence of said optical  
zooming mechanism and that the second zoom information  
indicates the absence of said optical zooming mechanism,  
and for controlling said electronic zooming means in  
such a manner as to be able to be driven, in a case that  
25 the first zoom information indicates the absence of said  
optical zooming mechanism, and for controlling said

electronic zooming means in such a manner as not to be driven, in a case that the second zoom information indicates the presence of said optical zooming mechanism.

5 55. The imaging apparatus according to claim 54,  
wherein, when said external lens means is included in a specific lens group containing a lens that causes the second zoom information to indicate the presence of said optical zooming mechanism, the second zooming  
10 information on said external lens means is permitted to indicate the presence of said optical zooming mechanism.

56. The imaging apparatus according to claim 54,  
wherein information represented by the optical zooming  
15 control signal includes at least one kind of information representing a zooming direction to be given to said external lens means, information representing a zooming speed to be given thereto, and information representing both a zooming direction and a zooming speed to be given  
20 thereto.

57. An imaging apparatus comprising:  
imaging means;  
electronic zooming means for enlarging an image  
25 taken by said imaging means;  
zoom input means for receiving zoom operating

information;

lens information input means for receiving zoom  
information, which indicates presence or absence of an  
optical zooming mechanism in an external lens means, and  
5 specific lens group information which indicates whether  
said external lens means belongs to a specific lens  
group;

control output means for outputting an optical  
zooming control signal which instructs said external  
10 lens means to perform a zooming operation; and

control means for controlling said optical zooming  
mechanism of said external lens means through said  
electronic zooming means and said lens control output  
means according to the zoom operating information  
15 inputted to said zoom input means in such a manner as to  
be able to be driven, in a case where the zoom  
information indicates the presence of said optical  
zooming mechanism and where the specific lens group  
information indicates that said external lens means does  
20 not belong to said specific lens group, and for  
controlling said electronic zooming means in such a  
manner as to be able to be driven, in a case where the  
zoom information indicates the absence of said optical  
zooming mechanism, and for controlling said electronic  
25 zooming means in such a manner as not to be driven, in a  
case where the specific lens group information indicates

that said external lens means belongs to said specific lens group.

58. The imaging apparatus according to claim 57,  
5 wherein, when said specific lens group contains a lens having an optical mechanism that does not operate in response to a control signal received from an external device.

10 59. The imaging apparatus according to claim 57,  
wherein information represented by the optical zooming control signal includes at least one kind of information representing a zooming direction to be given to said external lens means, information representing a zooming  
15 speed to be given thereto, and information representing both a zooming direction and a zooming speed to be given thereto.